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ABSTRACT

This paper is based on two fundamental premises: (1) that the characteristics inherent in information (reproductivity, volatility, and value) combined with the technical capability provided by the new information technology (access, storage, communication, and control) have created the prospect of a new range of internal and external networking possibilities within universities that could provide a major impetus for constructive change in universities; and (2) that, as electronic networking develops, universities will have at their disposal the experience of an underutilized resource of great value--the university library. Support for these arguments is provided by discussions of current problems emanating from information technology that are facing higher education; parallels between the roles and activities of universities and university libraries; specific lessons offered by library networks that are worthy of consideration by universities; and further observations about the general problem of electronic proximity. In addition, an outline of major institutions in the library/information arena that have been major participants in the formation and operation of networks describes the background and major operations of OCLC, Inc., the Research Libraries Information Network (RLIN), the University of Toronto Library Automation System (UTLAS), and various regional networks, as well as providing citations to related literature. (KM)

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Dr. Louis Vagianos

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THE JEWEL IN THE TEMPLE:
University Library Networks as Paridigms for Universities

General Introduction

We live in a complex technological society in which the only constant is the exponential rate of change and the explosion of new knowledge and its applications. As in the perverse world of Alice, we must now run as fast as we can in order to stay in place. Worse still, the explosion of new knowledge and its applications, coupled to the exponential rate of change has introduced a level of complexity which has made it increasingly difficult to predict future needs or the range of effects a single event or innovation will have. At the same time, it is becoming increasingly apparent that human beings and institutions cannot adjust easily to change of the scale and speed the world is presently experiencing. The result is an unsettled society, undergoing a period of institutional instability and human uncertainty.

As we move towards the twenty-first century, the powerful forces of technology which are driving the changes within our institutions and our society show little sign of abating. In fact advances in computers, communications and micro-electronics are creating a new society, based on information services and built on a new style of commercial activity. What is obvious is that the information technology which supports the new information industry promises to change the manner in which we make decisions, govern, work, play, study, and transact our business.

Information-based or information-intensive services per se are not new. They have an existence which is thousands of years old. What is new stems from three factors:

- for the first time in human history, information-based industries have become the major source of economic growth;
- technology has altered fundamentally the amount, content, form and delivery of information services;
- the rate of technological change surpasses any previous period in human history.

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TO THE EDUCATIONAL RESOURCES

> In 1970 Stafford Beer encapsulated the problem neatly:
> Society has become a complex organism, and it needs a nervous system. Managing the development of informational science and technology is all about this task. There is no other message than this.

At the same time he advanced four fundamental propositions of information technology:

1. We can now automate whatever we can exactly specify.
2. Most (possibly all) ostensibly human prerogatives for inferential, judgemental, learned, and adaptive behaviour can be exactly specified--at least with respect to finite contexts.
3. Within specified frameworks, much ostensibly intuitional and creative behaviour can be indistinguishably imitated by machine.
4. Distance is technically irrelevant.

For many of us in universities the doubts which may have been expressed about these propositions in 1970 have diminished in the face of 15 years worth of further technological advances. Instead, our attention has turned to harnessing information technology effectively within the university environment in order to cope with the challenges of the new technological order and to meet the increasing demands of our shareholder (society). To date, the goal has proven elusive.

This background paper takes as its fundamental premise two factors:

- The characteristics inherent in information (reproductivity, volatility, and value) combined with the technical capability provided by the new information technology (access, storage, communication, and control) have created the prospect of a new range of internal and external networking possibilities within universities that could provide a major impetus for constructive change in universities. In fact, creating electronic proximity can introduce the most transformative period of institutional renewal undertaken by universities in living memory, because electronic networking can provide a suitable mechanism for efficient linkage among designated teachers, students, researchers, librarians, administrators, and to both private and public local, state, and federal resources.

- As electronic networking develops, universities will have at their disposal the experience of an underutilized resource of great value--the university library. The understanding and implementation of systems which create effective electronic proximity are well into their second decade among university libraries, with many of the cooperative, resource sharing examples interesting and instructive.

The argument which supports our premise is developed within the following framework:

- some problems facing higher education which are emerging from the new order of things;
- some parallels which exist between the roles and activities of universities and university libraries;
- some specific lessons library networks offer which are worthy of consideration by universities;
- some further observations about the general problem of electronic proximity;
- a brief summation.

1. Some Problems Higher Education Must Confront

At a recent national conference on worldwide trends and their implications for higher education, nine trends were singled out for debate and discussion. Like all such lists, the trends selected are neither definitive nor exhaustive, but they do serve to illustrate the range of pressures involved:

1. issues of war and peace and freedom and survival;
2. exploding population growth with its concomitant pressure on world resources;
3. energy issues;
4. oceans and the whole question of ecology;
5. aging populations in development countries;
6. genetic engineering;
7. increased interest in how the mind works;
8. technological revolution;
9. the problem of change.

Obviously, any considered discussion about their implications for higher education is beyond the scope of this paper. No matter, even a cursory review of the literature dealing with higher education demonstrates a debate is raging and that there is plenty of material on the subject to go around. In any event our concern is more specific and centers on some of the immediate changes threatening the closed system model of the traditional university which emanate from information technology.

(As an aside, before citing some obvious examples, one disquieting observation: the debate surrounding higher education has resulted in a mountain of commentary and a spate of suggestions for improvement but there is conspicuous silence on the subject of the role of libraries and the lessons that might be learned by educators from the collective experience of librarians. This revelation is particularly upsetting when applied to universities, for, as will be argued, university libraries are central to the university's mission.)

The university is one of the leading traditional information industries in our society, but technology is creating challenges which are not being met. As a result, new forms of competition are emerging. They range from the in-house training programs of alternative institutions to corporate offerings of degree programs. Two examples of corporate offerings: Arthur D. Little offers an MBA program, while the Wang Computer Firm offers a master's degree in software engineering. These competitive pressures are likely to intensify in the years ahead as computer-communications network developments offer corporations and individuals a greater ability to supply educational offerings of all kinds.

The university's constituency is also changing. The 18-22 age cohort is declining in size, while the 30-50 age cohort is growing proportionately. At the same time technology is placing new demands on occupational mobility. The average worker today already is expected to undergo three distinct careers during his/her working life. Thus, not only is an adult audience now there in terms of numbers, but the need for adult education is also becoming more pressing.

Location is another area in which universities are under pressure. They are being asked to reach out to students, especially adult students, to bring program delivery to where those students work and live. The self-contained university campus is no longer adequate to society's needs.

Universities are also being asked to link with industry and government, to play a more constructive role in fostering research and development of general economic benefit. Technology has greatly shortened the time line between basic research, the traditional research field of the university, and applied research. But the institutional versus technological base currently available is not sufficient to accommodate this change. To solve this problem there has been a rise in private industry involvement in basic research as well as government laboratories. Thus, the university faces new competitive pressures on both its teaching and research functions.

Moreover, as is always the case with technology there have been unexpected side effects for universities which relate specifically to the phenomenon of creative destruction first identified by Joseph Schumpeter. As we have come to know, technology both regenerates and destroys. For example, as a major user the university is being directly affected by the impact of technology on a number of applications--research applications, library applications, administration applications, teaching applications. All are observable in the university, and all offer advantages in terms of increased efficiency/productivity (e.g. more/better research). On the other hand these same applications are also a source of negative pressure, partly because they involve high start-up costs in a time of major financial constraint and partly because they evoke a resistance to the organizational change needed within the university community during this period of intense institutional insecurity.

In any event, the resultant institutional problems higher education faces argue for a different model of the university--one which will necessitate improved co-operative measures. From our vantage point the creation of networks for facilitating electronic proximity is one mechanism which should be seriously considered. It cannot solve all the problems higher education must overcome, but it can offer an environment in which useful educational reform can be effected.

2. Some Parallels Existing Between Libraries and Universities

The university library, like the university it serves, is also a major, traditional information-based institution in our society. It too is being buffeted by the forces of technology and changing attitudes within our society. What makes the university library's experience a valuable guide for university administrators is the fact that the university library has much in common with the university as a leading information-based institution. Consider:

The task of the university is to create an environment which permits reflection, research and specialized training. It is here that scholars, researchers, and students are encouraged to seek knowledge, to examine it, question it, and to learn to transmit it. And it is here they are taught how to explore society's "collective" mind through the medium of ideas, to understand that everything vital to one's life reduces itself ultimately to ideas.

The "raison d'être" of the university library is equally clear: to collect, organize, disseminate, and preserve the "collective" mind. In short, to provide the information which underpins the university's mission. Librarians, like educators, have long understood man is what he thinks and so ideas are the motive forces which shape history.

Universities and university libraries thus share a common heritage and mission:

- Each, as it has evolved over time, has become an instrument for promoting equity, equality of opportunity, in our society.
- Each draws some part of its support from groups outside its direct user constituency, whether from government or private sector support.
- Each, in its essence, is a communication system, providing the connective tissue which joins different constituencies, activities and resources.
- Each is critically dependent on public (voluntary and government) financial support which is declining in real dollar terms.
- Each has experienced sharply rising resource prices (the university for professors, equipment and physical plant; the library for staff,

books/periodicals, and computer/communications equipment), both absolutely and relative to the economy as a whole.

- Each faces increased competition from external institutions--the university from private sector research and schooling, and the university library from private industry data bases/information services. In both cases there is a distinct danger that "cream skimming" will have general effects which are permanently deleterious.
- Each must cope with intense public stresses as a result of the increased complexity of their social environments and the importance of intellectual property in the information age--for the university the issue is one of "core curriculum", for the library the issue is one of "fair use".
- Each has traditionally operated as a closed system in both spatial terms and in membership aspects, but the impacts of information technology are making this traditional, stand-alone model less desirable, less appropriate, and less possible.

Within these general similarities, there are of course differences. Take two obvious ones:

- the university is concerned with the generation of new knowledge, where the university library is concerned with the dissemination of existing knowledge;
- the university is concerned with the transmission of culture, while the university library is concerned with the preservation of culture.

These differences are, however, subtle, particularly if we define the university as an institution for the acquisition and communication of knowledge of the human condition. Within such a definition the symbiotic relationship between the university and the university library is obvious. Equally obvious is the fact that for reasons of quality, preservation of mission, maintenance of public support, and meeting the demands of constituents, the traditional closed system model cannot survive and must be supplanted by an open system model. In the context of today's communication environment this means adaption to and acceptance of electronic proximity. And thanks to an extraordinary range of experience, it is in this context that university libraries have much to share with their "keepers".

3. What Lessons Involving Electronic Proximity do Libraries Offer to Universities?

The impetus behind the development of co-operative networks among university libraries was originally an imperative for better service and more value for the limited monies available to them. Financial pressures on university libraries have always been continuous, unrelenting, and potentially erosive. They never had sufficient funds to meet user demands. Moreover, over the years the volume and variety of material has been growing almost exponentially, so that the collection, preservation, coding and retrieval problems inherent in this situation have made the self-contained, comprehensive collection an impossibility.

In addition, libraries faced external competition as well. Many traditional library functions were externalized by information technology: private data base vendors offering search services, bibliographic services, index services, etc. became competitors to the library. This competition was stiff and remains in those areas with the greatest value-added for the consumer. And unless libraries can meet the competition, they are faced with the prospect of being left with the residue of services which have the lowest value-added appeal, a base insufficient for the library to continue to command adequate public support. More importantly, further innovations such as CD-Rom's and full-text data bases will give a new flexibility and mobility to the materials traditionally held on deposit by the library, transforming fundamentally the notion of a library "collection". The advent of the PC will give the centralized vendors real power for diffusion of their products through networking. And the ease and inexpensiveness of photocopying or other forms of duplication (e.g. data base downloading) will bring libraries into conflict with authors and publishers over what constitutes "fair use" of copyright material. In the face of such pressures, basic institutional survival could well be put into question.

The traditional network concept embodied in the library is one defined in terms of physical space and physical artifacts (e.g. in-house or inter-library loan). The world of micro-electronics, computers, and electronic communications has changed this permanently. The library of the future, if it is to remain a social

institution true to its original mission, can no longer be defined by a building or a local collection. Rather, it will be defined by the value-added service contribution it offers to its user constituency. For this reason, libraries have worked, and will continue to do so, to create networks which allow remote access to appropriate resources for designated users, a service that will eventually be extended to all users and suppliers as well.

Briefly, then, university libraries are institutions with an extensive heritage and an entrenched organizational culture, which were strongly challenged by both users and potential competitors. While there remained a continuing need for the library as an archival depository within its primary setting, librarians recognized that the traditional role of university libraries as information collectors and information storage providers had to be enhanced, and where appropriate supplanted, by the new role of information processor. The initial response to the demands of a changed environment was to attempt to become external networking agents. The host of networking applications devised to fulfill this new mandate introduced three levels of lessons which are especially noteworthy for consideration by other university administrators:

1. the library as a role model of both an educational and a social institution;
2. the networking systems already provided for/by libraries, on which the universities may be able to "piggyback" for extended pedagogical reasons; and
3. the recognition that university libraries have an educational role to play, not only in terms of its role in providing support materials for courses and other educational offerings, but also in the important task of educating users in the tasks of information seeking and information use. These tasks will become increasingly integral to learning and to pedagogical technique as well as to research in the information age and will create a new internal role for the librarian as a member of the teaching/research faculty team.

Put another way, during the past two decades, despite their relative insularity, financial constraints, and staff shortages, university libraries have succeeded in doing some interesting and pioneering work in the design and implementation of networks facilitating electronic proximity:

- common cataloguing systems are one of the earliest examples of such networking;
- inter-library loan networks;
- bibliographic/indexing services;
- electronic bulletin boards;
- electronic messaging systems;
- a systematic, comprehensive, across the board system for interaction with commercial vendors, etc.

In general, libraries have been ahead of universities as a whole in their participation in and use of electronic networks. Unfortunately, for a variety of reasons, most of these networks have not been directly accessible by users. (A partial description of some of these electronic network developments is attached as Appendix I.)

Among the more important lessons learned by librarians during the process which can be studied with profit by others within the university community are:

- the establishment of standards and protocols;
- experience with alternative electronic communication options
- staff training requirements
- equipment needs
- data base building
- interaction with vendors and commercial suppliers
- user interface requirements
- inter-institutional resource sharing
- inter-institutional cost sharing
- usage pricing alternatives.

Some specific observations involving insights gained while developing university library networks may also be useful. Here are a few:

- the utility of local regional networks will be reduced or eliminated as random access to remote resources is improved and will lead to the requirement of individual workstations at which the scholar, student, businessman, or librarian transact their business directly;

- the important issue of centralization (desire to build large resource bases for national resources exchange, improved standards, inexpensive telecommunications) vs. decentralization (fear of loss of autonomy/control, increased telecommunications costs, technological advances in mini- and micro-computers, increasing costs of network services) will require resolution but, given the changing technology may have to be resolved on an individual basis;
- economic realities constitute the largest problem in networking, with a particular issue being transaction-related pricing (OCLC) vs. resource unit use pricing (UTLAS);
- the focus of university library networking is shifting from applications systems (catalogue card production, automated circulation control, bibliographic services) to creating real-time links with university library collections throughout the world, with the "linking" of disparate systems showing promise of becoming the major university library automation topic;
- a major problem in library resource-sharing networks, even after more than a decade of operational activity, is a chronic shortage of staff, resulting from the number of institutions involved, the size of staffs, and the variety of services. Accredited schools, in-service training, continuing education, and certification have all failed to solve the problem. One reason may be that competition from the private sector for skilled staff is increasing;
- electronic proximity involves the critical, and as yet unresolved issue, of intellectual property because a) the technology makes downloading and copying so much easier, and b) network systems require sophisticated software development and distribution, raising software copyright issues;
- while the adoption of micro-computers as the standard tool for network access is the result of unquestionable technical advantages (ubiquity, an established operating system, low cost, high reliability, and easy linkage), it also involves costs and complexity in training, follow-up, and liaison, and increases individual institutions' propensity to believe that they can go it alone;
- university library networking must cope with a hostile information and communications environment which is not likely to change and an unstable internal structure (contracts, ethics, consultation, and governance);

- networks represent new social structures in the academic world crossing geographical and political boundaries and rising above the established patterns of discourse in professional associations and among institutions and will require more imaginative legal and organizational arrangements.

Some other lessons gleaned from the experience of the OCLC Consortium, which has been in operation for some 15 years are also interesting:

- the final development of a network may not be imaginable at its inception (and if it were, might be successfully resisted on "political" grounds);
- the implication of electronic proximity may be the creation of an emergent institution which is invested with disproportionate power in relation to any individual network member;
- as a network becomes a value-added, sui generis, new and important legal and political issues will arise;
- standardization for communication and standardization for interfacing are not always congruent, and communication tends to set the pace for other network activities.

4. Some Further Observations About the General Problem of Electronic Proximity

As noted earlier, the lessons cited from the experience of university libraries as worthwhile or applicable for consideration by university administrators have all emerged as a result of the relentless push of technology towards an information society. Yet this technological push should not be permitted to cause us to lose sight of primary institutional goals. Constructive institutional adjustment is one thing, pernicious compromise another. Again, it is instructive to quote Beer:

> We might well say that it is a problem
>
> not so much of data acquisition as of right storage,
>
> not so much of storage as of fast retrieval,
>
> not so much of retrieval as of proper selection,
>
> not so much of selection as of identifying wants,
>
> not so much of knowing wants as recognizing needs.

Beer was not speaking of universities or university libraries specifically, but his summary of the problem is equally applicable to both. Providing for appropriate user needs is what drives both institutions. Universities and university libraries must, therefore, not be pushed by a technological imperative. Rather, they must be pulled by the power of our mission.

Within this context the application of Beer's argument in university terms is obvious. As a closed system, the traditional university has been site specific; it has worked by bringing students, faculty, and support services all together in one place. University reputations have been built on such foundations as the number and quality of faculty, or the number and quality of students, or such supporting infrastructure as the size of the library collection. Part-time students have been regarded at best as peripheral and at worst as a disruption and a nuisance; full-time students count most because they are full members of the closed system. External influences exist but, as much as possible, they are internalized whenever the opportunity arises. Thus, faculty, programs, and students are seldom shared by universities even when they are located in the same community. In the past, universities have thrived on competition with one another for faculty, research grants, students, and other scarce resources, but such competition is now an expenditure of resources few can afford.

There is little doubt now that the closed model of the university will be changed by the forces resulting directly or indirectly from technological change. Already these forces have created the new constituency identified earlier--adult or life-long learners. They are also creating a greater demand for part-time studies, for time-of-day flexibility in course offerings, and for new mechanisms to bring courses to people rather than bringing people to courses.

Yet this is only a beginning of the changes. As full-text data bases become more prevalent, as CAI/CAL programs become more common and of better quality, as expert systems come to provide a real interactive machine learning capability, and as electronic networking makes the academic information entrepreneur a reality, the teaching function of the university will be under increasing competitive pressure.

And as R & D becomes quintessential to the technological world and its economic well-being, the basic research function of the university will be changed drastically.

If there is a major policy lesson universities can learn from libraries it is this: don't be negative or defensive. An active stance fostering progressive change and enlightened experimentation is the only way to ensure positive benefits. Higher education, like many of its libraries, must embrace the challenge of technology and its impact on society as a means of enhancing its unique contributions, reaching out to new audiences and new places through new programs and new associations. Universities, like its university libraries, can broaden their bases by developing the sorts of electronic proximity their new environment demands.

True, the university is but one piece of the complex fabric modern society has become; but, as a primary agent for the acquisition of information, it has a vital role to play in maintaining the durability of the social fabric. It cannot do so without adaptation and modification; and, it cannot do it alone! The university library has already realized this, seeking out new networking arrangements which will help it to survive as the public institution of social record. The university, of necessity, will follow in many of the library's paths and can benefit from lessons already established.

Earlier in the paper, it was noted that the university library had to adapt and modify its traditional role as information collector and information storage provider to that of information processor. Such a change would lead to some interesting and innovative consequences but would require some major organizational adjustments within the university environment. What is noteworthy is that the change was not possible twenty years ago. Consider:

Technology, and the changing role of the university library it prescribes, implies a convergence within the university of the library and the computer centre --a convergence which can be replicated on a larger scale in the university's relationships with society. In its traditional role, the library has acted as a repository of pre-packaged information and as an information lender. The

computer center, as it has been evolving, has provided for information input, storage, retrieval, and manipulation. It processes information, albeit not primarily that of a pre-packaged variety. As the technology improves, the computer center increasingly becomes the hardware link for faculty/student access to all types of information products. At this point, the evolutionary trends between the university library and the computer centre will reflect an almost complete convergence at the technological level. More important, the skills of the university library staff, together with the necessity of the university library becoming an information processor, converge with the need and ability of the computer center to develop and provide such services. What should emerge is a single university information center, a fact not yet recognized at the organizational level in most universities.

This notion of a university information center formed out of the existing library and computing center units has been advanced by several commentators, including Vagianos, Battin and Neff and was, in fact, implemented at Dalhousie University in 1975. As noted, there are administrative and technical arguments to recommend this organizational change, but the most important is that such a move embodies the essence of the case set out for the university and the library to adopt new roles. Orienting their major focus to recognizing and meeting a new set of user needs as information processors is a necessary and useful first step. In the information age this will mean accepting machines and electronic networks as the physical artifacts of a renewed educational system.

Put in these terms, the lessons drawn from the university library case can be generalized to the situation of the university as a social institution. Major parts of the networking functions libraries now operate in support of their own services may be extended within the university. For users and suppliers, the evolution of such links may be transparent, that is not readily noticed as an element in the operational delivery of services, but in terms of recognizing and responding to users' needs the results will be very apparent. The symbiotic relationship of the university library and the university, complementing and reinforcing each other, can then be extended among other institutions as well.

This discussion does not imply that university libraries already have all the answers. Far from it. But since a number of rivers have been crossed, often painfully, there is much experience to be shared. Part of the value for universities will be in learning what to try and what not to try; what to do and what not to do; what worked as well as what didn't. University libraries, though, still have an extensive future agenda of their own:

1. they must come to grips with networks as a primary service offering, not a peripheral undertaking;
2. they must extend network applications, creating electronic proximity at the user level;
3. they must see themselves as part of a larger community, with the primary purpose of serving the needs of that community while co-existing with other parts providing service.

Facing these issues implies solving such problems as the legal implications of sharing resources and of accepting and meeting obligations to external donors (government, private business, and the general public), sometimes at the expense of local service. Make no mistake, university libraries still have a lot to learn and a long way to go!

The transition of both the university and the university library from closed systems, defined by geographic boundaries and material and human resource collections, to open systems connected through networks for electronic proximity (i.e. location independent, distance insensitive) will necessitate extraordinary effort. Both universities and university libraries have been, to a large degree, passive observers of their larger environment. This passivity must change. What is needed is a leadership role in developing the networks which are called for while defining their place in the new order. The alternative may be to discover, too late, that the potential of the new technology has by-passed them and has been exploited by other, as yet undetermined, institutions.

The active stance of leadership in handling information issues which is called for requires a variety of institutional responses from universities which will be difficult to initiate and sustain within the context of existing organization and charters:

- the adoption of a planning framework (something remarkably absent in universities and most university libraries);
- attitudinal changes at both the institutional level and staff level regarding the institutional mission, its relationship with, and its responsibilities to, the internal university community and to other communities that must be involved;
- a new dynamism, meaning two things: the speed "with which messages are promulgated, overtake each other, and combine to form new patterns"; and the speed with which universities can respond to market pressures and opportunities.

Legal and institutional reform will also be needed to ensure inertia does not remain as an excuse for inaction.

The transition will involve substantial financial costs too. In the long run, the changes in operation will produce economies which more than pay for the investment, even in narrow financial terms. But in the short run, there will be major outlays for equipment, planning, promotion, and a host of unforeseen contingencies. In a time of major financial pressure on both universities and libraries, this is not a trivial concern and will call for resourcefulness and courage on the part of the players.

A Brief Summation

In the light of the problems of transition and costs described, is the prescription for change which has been made here reasonable? The answer, we would suggest, is <u>not</u> whether the university or the university library, organizationally and financially, can afford the change. Rather, we would suggest that the answer is in fact another question--can either afford not to make the change?

In 1982, the U.S. Office of Technology Assessment, in a study of the impact of information technology on American education, stated:

> Modern society is undergoing profound technological and social changes brought about by what has been called the information revolution. This revolution is characterized by explosive developments in electronic technologies and by their integration into complex information systems that span the globe. The impacts of this revolution affects individuals, institutions, and governments--altering what they do, how they do it, and how they relate to one another. If individuals are to thrive economically and socially in a world that will be shaped to a large degree by these technological developments, they must adapt through education and training.

We have not advocated that universities embrace the changes recommended for defensive, self-serving reasons. We recommend them because the technological imperative is forcing us to think anew. To paraphrase Marshall McLuhan, a prophet of the new order:

> old ways of thinking and old formulations will not permit us to fit the embryonic world of tomorrow into yesterday's conventional cubby holes.

Part of what is unique about the university and the university library is that they are both educational institutions and social institutions. The information age is marked, amongst other things, by an increasing commoditization of information. Both the production and the dissemination of information are being increasingly commercialized for a profit-seeking motive. But it is neither efficient nor equitable, at the societal level, to allow the educational function, as a primary information activity, to fall victim to this trend.

As social institutions, both the university and the library play major roles in "the acquisition and communication of knowledge of the human condition". In the new information order, it is important that these roles not be lost. We must be concerned with more than what is commercially viable; the human condition is more than just profits. It is this role of the university and the university library in serving those needs as an end that sets them apart from commercial information undertakings. From a perspective of universities and libraries as generic institutions, there is no more important lesson to learn. Universities and university libraries must be concerned with equity; welfare is not consonant with ability to

pay. They must also recognize that networks are not just machines or wires or digital bit streams, they are people. Serving people must remain the essence of the university and the university library. This is what creating electronic proximity as a response to the changing information needs of society is about.

Finally, we should bear in mind that the information technology which is pushing us into a new age is a means and not an end, an aid and not a cure. It is ushering in an era of hitherto unimaginable potential and opportunity, but it is also fraught with danger and possible pitfalls. How prescient Goethe's remarks in 1810:

> The modern age has a false sense of superiority because of the great mass of data at its disposal. But the valid criterion of distinction is rather the extent to which man knows how to form and master the material at hand.

APPENDIX I
Some Sources of Relevant Experience in Creating Electronic Proximity

The following appendix briefly outlines some major institutions in the library/information arena which have been major participants in the formation and operation of networks. It is not intended to be exhaustive, nor does the exclusion of any particular operation from this appendix mean that it has no lessons to teach. In particular, the rather large proliferation of small, regional networks may have specific lessons relating to getting started and overcoming institutional autonomy which will be of great value. The very specific nature of the lessons and the regions involved makes their inclusion in this general conspectus inappropriate.

Each entry covers the institution and its major operations, and provides a selection of recent literature. More attention to topics of universal concern can be found inter alia in the following:

Annual Review of Information Science and Technology, v. 16, v. 18, and v. 20 (White Plains, NY: Knowledge Industry Press).

Axelrod, Robert: The Evolution of Cooperation (New York, Basic Books, 1984).

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A. OCLC Inc.

One of the major bibliographic utilities in the world, OCLC (the oldest and largest of the automated library networks) is a valuable object lesson in several important aspects of electronic proximity creation. Not the least of these is that a utility can take on forms which are a complete surprise to its original creators (OCLC was originally the Ohio Co-operative for Library Cataloguing). OCLC represents the experience of a continental system which has had to resolve questions of resource use, the nature of the consortium "management" and its relationship both to member institutions and the networks through which access to OCLC resources is gained, the autonomy of networks, the role of network directors in OCLC governance, and coping with the tendency of networks (which serve as OCLC conduits) to offer competitive services. The sheer size of OCLC operations make it a good source of information about growth and complex management problems.

Some appreciation for the scale of OCLC activities can result from considering to following 1985 statistics:

6,082 member libraries
6,584 dedicated terminals on-line
25,500,000 items catalogued on-line
131,000,000 catalogue cards ordered
2,200,000 inter-library loan transactions
1,140,000 cataloguing records
756,768 titles ordered on-line
64 on-line union lists of serials supported for 2,065 libraries
200,900,000 location listings

43 computer service agreements serving 108 libraries
$69,069,000 in service revenues
$37,500,000 net worth.

The financial statistics alone give a dollar quantification of the costs involved in creating networks at the international level.

In addition to the production of library cataloguing, OCLC is involved in a number of projects and services for network application:

- the CONSER (Conversion of Serials) Project, the development of a national serials data base;
- collaborative development of non-Roman alphabet capabilities;
- EASI Reference Service, subject access to a subset of the OCLC data base;
- retrospective cataloguing production in machine-readable format;
- an automated serials check-in system;
- an automated acquisitions system available on-line;
- development of a Gateway Service, allowing the user to access different networks through the same terminal in the same session;
- sponsorship of research and development in areas outside "pure" library automation (e.g. teletex/viewdata).

Information sources:

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Address: 6565 Frantz Road, Dublin, OH. 43017, U.S.A.

B. Research Libraries Information Network (RLIN)

RLIN is a program of the Research Libraries Group (RLG), representing an outgrowth of the Bibliographic Automation of Large Libraries using an On-Line Timesharing System (BALLOTS) project. Originally designed to serve the Stanford University Libraries, the system was extended to academic and public libraries for cataloguing, searching, and inter-library loan functions. RLIN has placed considerable emphasis on educating scholars about the current and future developments in research libraries, including interconnection of networks for electronic mail, computational resource access, scholarly information, mediated access to information resources, full-text retrieval on-line, digitally encoded image data, and international data retrieval. RLIN is developing the Linked Systems Project, which will not only provide interactive facilities for large centralized library data base systems, but will also interact with local systems at individual member institutions. The emphasis RLIN has given to electronic connections makes it a valuable source for lessons on both the organization and economics of electronic proximity.

In addition to RLIN bibliographic activities, the RLG is also active in a number of projects of wider scope:

- the sharing of collection information via the RLG Conspectus On-Line;

- development of expert systems software to aid users in formulating search queries and interpreting results;
- development of the Patron Access Project, allowing direct user search of networked library catalogues;
- harnessing optical disk technology;
- on-line implementation of non-roman alphabet capabilities (with OCLC);
- establishment of a real-time transatlantic telecommunications link with the British Library for co-operative programs of research and development.

Information sources:

Anon.: "British Library Transatlantic Computer Link", Library Hi Tech News, no. 18 (July-August 1985): 6.

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McCoy, Richard W.: "The Electronic Library: Essential Tasks for the Scholarly Community", Library Journal, v. 110, no. 16 (October 1985): 39-42.

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The Research Libraries Group News, various issues.

Address: Jordan Quadrangle, Stanford University, Stanford, CA 94305, U.S.A.

C. University of Toronto Library Automation System (UTLAS)

UTLAS developed as a Canadian equivalent of BALLOTS: the computerized system of a major university library which developed into a utility network, with initial emphasis on Canada, and later extension to the U.S.A. The services offered by UTLAS include cataloguing, retrospective conversion, data base searching, on-

line ordering, and catalogue/circulation control systems. UTLAS is a good source of information for operations in a national context which differs from that prevailing in the United States, and for lessons relating to transborder data flows to and from the U.S.A.

Additional UTLAS developments include:

- integration of the REMARC data base (which allows for retrospective machine-readable cataloguing) with the UTLAS data base;
- availability of MARC records for Japanese imprints.

Information sources:

Anon.: "UTLAS in Westchester: Reconversion and Cataloguing", Library Journal, v. 110, no. 12 (July 1985): 20.

_____: "UTLAS Expanded U.S. Activities", Library Hi Tech News, no. 18 (July-August 1985): 7.

_____: "UTLAS at ALA", Library Systems Newsletter, v. 5, no. 9 (September 1985): 71.

_____: "Utlas [sic] Moves Into US Market with New Systems, Huge Database", Library Journal, v. 109, no. 11 (June 15, 1984): 1168.

Martin, Susan K.: Library Networks, 1981-82, Chapter IV (White Plains, NY: Knowledge Industry Press, 1981).

Address: 130 St. George Street, Toronto, Ontario, Canada M5S 1A5.

D. Regional Networks

The following list of regional networks highlights only a major subset of such organizations. The systems and services available vary, as do the network

topologies and environment, but each well may have important lessons to teach in relation to their specific region.

1. AMIGOS - a Southwestern U.S. consortium (with extensions into Mexico) primarily comprising academic libraries. See - "Micro Support from AMIGOS: Training, Consulting, Technical", Library Journal, v. 110, no. 10 (June 1, 1985): 72; Que Pasa? Newsletter of the Amigos Bibliographic Network, various issues. Address: 11300 North Central Expressway, Suite 321, Dallas, TX 75243, U.S.A.;

2. Bibliographic Centre for Research (BCR) - a Rocky Mountain/Midwest broker of automated library services. See - "50th Birthday Marked by BCR-Rocky Mountain", Library Journal, v. 110, no. 10 (June 15, 1985): 60. Address: 245 Columbine, Suite 212, Denver, CO 80206, U.S.A.;

3. Cooperative Library Agency for Systems and Services (CLASS) -formerly the California Library Authority for Systems and Services, a statewide data base and support service marketing agency which has since extended beyond state borders. See - Bruer, J. Michael: "Lessons from CLASS", Library Journal, v. 119, no. 21 (November 15, 1984): 2119-2124; "CLASS to Work with UC on Conservation", Library Journal, v. 110, no. 10 (June 1, 1985): 60. Address: 1415 Koll Circle, Suite 101, San Jose, CA 95112, U.S.A.;

4. New England Library Information Network (NELINET) - a large regional network of diverse membership, supplying OCLC access and regional computing services. See - Kruger, Betsy: "NELINET: A Case Study of Regional Library Network Development", Information Technology and Libraries, v. 4, no. 2 (June 1985): 112-121. Address: 385 Elliot Street, Newton, MA 02164, U.S.A.;

5. Southeastern Library Network (SOLINET) - one of the largest regional network organizations, with diverse membership, providing training for and access to OCLC and major information services. See - Chepesiuk, Ron; and Tarlton, Shirley: "SOLINET: What's In It For Us", Wilson Library Bulletin, v. 58 (November 1983): 185-189; "AMIGOS and SOLINET Discuss Closer Linkage", Library Journal, v. 110, no. 2 (February 1, 1985): 19; "SOLINET's New Program Will Support

Networks, Library Journal, v. 110, no. 7 (April 15, 1985). Address: Suite 410, 615 Peachtree Street, NE, Atlanta, GA 30308, U.S.A.;

6. Western Library Network (WLN) - formerly the Washington Library Network, this regional organization provides computer and cataloguing services for the Northwest U.S.A. with extensions internationally (especially towards Pacific Rim nations. See - "WLN Network Changes Name"/"WLN New Software Product"/"WLN Software Installed", Library Hi Tech News, no. 18 (July-August 1985): 6/14/7; "Worldwide Licencees of WLN System at Australia Meet", Library Hotline, v. 14, no. 37 (November 11, 1985): 11. Address: Washington State Library, Olympia, WA 98504, U.S.A.